

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 83000, CST 3:20p 46/1

This is Apollo control at 8 hours 30 minutes into the mission. We continue to have a very quiet period here in mission control center. On board the spacecraft, the crew also getting a bit of a chance to relax and get out of their spacesuits. We also anticipate they will be getting something to eat at this period. The midcourse correction maneuver, the first run of the service propulsion system engine which is anticipated to be about 2 to 3 seconds in duration, is currently scheduled for about 11 hours ground elapse time. That's about 2 hours later than it was originally planned in the flightplan. We anticipate that following that burn we will be back on the nominal flightplan. We do have some communication between capsule communicator, Ken Mattingly, and the crew and we'll play that back for you now.

SC Houston, Apollo 8.

CAP COM Go ahead, Apollo 8.

SC Roger. Dump before the burn. Will that foul your tracking up.

CAP COM Okay, let me run that one by.

Apollo 8, Houston. We don't have any objections to going ahead with the urine dump now. And for your information, the waste water dump, our schedule, we plan to put it off till about 11:30 and this will get you up to approximately 90 percent in your waste tank. It's a little higher than normal but we wanted to put this off until after the burn was completed. And some of the other things that we've got coming up about 9 hours you have oxygen fuel cell purge. And we've already mentioned the deletion of the star landmark sightings. From 10 to 11 we have put aside for the burn preparations. And a final score is 31 to 20.

SC Reed won over Dallas, huh?

CAP COM How about that?

SC Houston, how do the circuit margins on the S-band look as compared to your preflight calculations?

CAP COM Okay, Apollo 8. It's a little bit early to give you any real numbers on your com performance. Looks like its working as good as predicted and everything else seems to be doing better so this may be doing better too after we have done our next com checks some of these other things will have a better handle on, I can give you a quantitative answer to your question.

SC Roger.

SC Houston, this is Apollo 8. How do you read me?

CAP COM Loud and clear, Apollo 8.

SC Roger. Sure got a nice view of the earth from here. We can see Baja California and about where San Diego ought to be.

CAP COM Very good.

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SC I can't see my dad's flight pool out there today, though.

CAP COM We'll tell the doctors about that.

PAO And that is the extent of that bit of communication with the crew. At the present time the spacecraft is approaching 40 000 miles in altitude. We're about 39 500 and the velocity continuing to drop off down now to about 9600 feet per second. At 8 hours 35 minutes into the mission, this is Apollo Control.

END OF TAPE

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PAO This is Apollo Control at 9 hours into the mission. At the present time the spacecraft has covered about 42, almost 43 thousand of the some 200 thousand miles separating Earth and Moon. It's now traveling at a speed of about 92 hundred feet per second or about 62 hundred miles an hour. Up till now the mission has gone extremely well. The spacecraft is performing nominally in all respects, and we continue to have a relatively quiet period, both here on the ground and from the communications with the astronauts on the spacecraft. We did have one brief communication a short while ago concerning data transmission from the spacecraft. And we'll play that back for you now.

CAPCOM Apollo 8, Houston. Okay, we dropped off a high gain on the OMNI there for a bit and went to a low bit rate, and we're getting ready to command you back to a high bit rate. Do you want us to keep you posted every time we change tape speeds?

SC We're not recording now anyway, Houston.

CAPCOM Roger, understand, but when we go to high bit rate, do you want to be kept informed every time we transfer? We hadn't planned on it.

SC I think if we need to record, we'll ask you on it.

CAPCOM Okay.

PAO That appears to be about all the conversation on that tape. At the present time the flight plan, the updated flight plan, shows the crew in an eat period and are interspersed with that activity for Bill Anders. He will also be doing some checks on the monitoring equipment onboard the spacecraft to observe the service propulsion system midcourse correction burn. That will be occurring in just a less than 2 hours from now as currently planned. At 9 hours 3 minutes, this is Apollo Control.

END OF TAPE

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PAO This is Apollo Control at 9 hours 24 minutes. The spacecraft at this time is about 45 thousand nautical miles from Earth. The velocity currently about 89 hundreded feet per second. We just had a rather brief communication with the spacecraft. Astronaut Lovell OMNI optics, the onboard system to assist him navigation - midcourse navigation, and reported that the sky around the Moon viewed through the sextant, the 28 power optical device on the spacecraft, appeared to be a light blue rather than black as he had expected. Lovell also reported that he was not able to see as many stars at various sun angles through the scanning telescope as he had expected and also that some light refraction apparently from the sun also interfered somewhat with his ability to see as much of the Moon through the sextant as he had anticipated prior to flight. We'll play back the tape to that conversation for you now.

SC Houston, Apollo 8.

CAPCOM Go ahead.

SC Roger, how does your tracking look on us?

CAPCOM On flight, tracking still in progress and a little to soon to give you a firm answer on the results, but everything looks nominal so far.

SC Is it working okay?

CAPCOM Seems to be. Apollo 8.

SC Go.

CAPCOM Okay, sometime when it's convenient for you now, I would like to see a oxygen fuel cell purge. And do you have an estimate on when you might be getting around to this com test.

SC Well right now we're right in the middle of trying to get something to eat, Ken. I guess we can do the fuel cell purge.

CAPCOM Apollo 8, there's no rush, just didn't know what you were doing at the time. Give us a call when you have a free moment, we'll pick up.

SC I'm fixing to start the O2 purge now, if you wish.

CAPCOM Okay, that'll be fine. And I'll keep track of the time for you.

SC Okay, that would be good. Turned on O2 now on fuel cell 1.

CAPCOM Okay, thank you. Apollo 8, Houston, that's about 2 minutes on your first fuel cell.

SC Roger, it's up, and number 2 on now.

CAPCOM Roger. Go ahead.

SC We're a long ways from my turn at the water gun, I might give some comments on the optics. There seems to

be quite a band of light that goes all the way across the scanning telescope anywhere in the vicinity of the sun. Just a little while ago we were in the position where I could pick up the Moon in the scanning telescope. And then I looked at it in the sextant, and the sky the space around the Moon was a very light blue, just about as light blue as we have back on Earth. And it's not black in that sun angle with the Moon.

CAPCOM Understand this light blue showed up in the sextant.

SC That's affirmative. I maneuvered the optics so I could pick up the Moon in the sextant and the space around the Moon is a light blue.

CAPCOM Roger, can you make any kind of estimate about the proportion of the radius, how far out that seems to extend?

SC Well, it extends the full length of the sextant. Actually I could see us coming as we moved across because the band of light in the scanning telescope cut across where the Moon was, and it moved in this area. I believed it's caused by the refractional light inside the optics themselves.

CAPCOM Roger.

SC Also I've been occasionally looking out to see if I could see stars at various sun angles, and at this particular altitude it's very difficult. In the scanning telescope the sun is very bright and the Earth is very bright. And if I looked at the Earth and tried to look for stars, I lose my dark adaptation very quickly.

CAPCOM Roger, do you have any problems seeing the Moon.

SC No problem seeing the Moon. When I looked for the star landmark line of sight, I - it very sudden present but it was very visible.

CAPCOM Roger, you say area illuminated in Earth shine show up?

SC Not at this altitude, and that's strange I thought I could see that. At this altitude the refractional light in the optics themselves due to the reflection of the sunlight I suspect or Earth's light completely blanked out the dark side of the Moon to this altitude.

CAPCOM How about that.

SC Maybe we have an atmosphere illuminate.

CAPCOM Okay, Apollo 8, looks like that ought to terminate fuel cell purging.

SC Roger.

PAO This is Mission Control, Houston. Some very interesting comments there from Astronaut James Lovell

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on the optical system for the Guidance and Navigation system aboard the spacecraft. The assessment here in Mission Control Center is that there is no problem associated with the minor anomalies Lovell mentioned. And this is verified by the fact that the crew has been able use the optics aboard the spacecraft to do the sightings that have been required. At 9 hours 32 minutes into the mission, the Apollo 8 spacecraft is now some 45 686 nautical miles in altitude. The vehicle has a total weight of 63 295 pounds and we would expect that to remain quite constant until the first significant use of the service propulsion, the first burn of the service propulsion system. At 9 hours 32 minutes 38 seconds, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control at 10 hours into the mission. At the present time activity here in Mission Control is beginning to pick up as we prepare for the first operation of the spacecraft service propulsion system engine, and matching that activity here on the ground is also heightened activity in the spacecraft. At the present time the crew is involved in making preparations for that burn scheduled to be a 2.4 second burn of the service propulsion system engine. That will occur in just about an hour from now. Scheduled to occur at 11 hours ground elapse time. During the next hour the crew will be involved in aligning the platform on the spacecraft. This is the stable reference in the Guidance and Navigation system which the spacecraft G&N system uses to tell it what attitude it is in. Also provides that information to the crew. At the present time while we're reading up from the ground the burn information which the crew will insert into the computer such things as the length of the burn and the time of ignition. We also have some recorded communication with the crew. We'll play that back and then pick up with the conversation as it progresses.

CAPCOM Go ahead Apollo 8.

SC You want to get started here around 10 hours, is that what you said?

CAPCOM Well, what we had planned was to use the 10 to 11 hour period as your preburn preparation just as we would have done normally. And -

SC Fine, we can go ahead and do that.

CAPCOM And if you can work in this com check before that it would be desirable but that's not a concern.

SC What do you want in the way of a com check, George?

CAPCOM Okay. What we've got here is a couple of DTO com checks. We'll be switching around to five different modes and only one of them will interrupt your activities. In that case we'll be switching to the uplink backup voice and that's the one time that you might lose temporary uplink voice com, you'll have downlink voice com throughout the entire procedure. And it ought to take you I guess 10 to 15 minutes max. The only requirement being that we should stay on a high-gain antenna.

SC Why don't we go ahead and start now then?

CAPCOM Okay, that sounds pretty good. Okay, Apollo 8 another couple of minutes and we'll be ready to go into our com check. And for your information looks like the signal strength is 3 to 4 dB better than expected on the wide range on the wide beam mode, and approximately that gives you 1.4 increase in your range.

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SC Roger, let's not increase by 1.4. more than.
CAPCOM Okay. I now feel like take a look at -
as you go through the PTC we have some who would like to know
if you can see any detectible effect on the windows in the
form of their fogging. Particularly does the sun seem to vary
fog intensity, does it increase it or decrease it or make you
go in patches or anything like that that you might be able to
notice.

SC The sun doesn't seem to change it much,
however, the different incidents of the sun's rays magnify
the fogging. Or at least change it.

CAPCOM Okay, Apollo 8. I'm sorry would you say
again please.

SC The sun doesn't seem to have any effect
on the windows themselves, but the different incidence - angles
of incidence of the sun's rays change the relative amount of
obscuration caused by the fogging.

CAPCOM Okay. Okay, Apollo 8, we're ready to go
into the com check now, and it's your option we can call out
switches and let you position them, or we can command it from
the ground. In either event there will be a couple of switches
that you will have to throw for us.

SC You command them, and we'll throw what we
have to.

CAPCOM Okay, I'll keep you posted on what we're
doing. The first test is an uplink voice and ranging with
fold downlink which is essentially what your doing right now,
used for a baseline.

SC Roger.

CAPCOM Okay, we're starting on test number one,
and if you would verify that S-band normal voice switch is in
voice.

SC Roger, we're in voice.

CAPCOM Okay. And the up telemetry data to data.

SC Roger, data.

CAPCOM Okay, and up telemetry command to normal.

SC Normal.

CAPCOM Roger, how about high-gain antenna track
to auto.

SC We're on OMNI now, we've got to wait till
we get around the other way.

CAPCOM Okay, what's your estimate?

SC We're at 15 minutes from it.

CAPCOM Okay.

SC Maybe we had better hold the com check till
after the midcourse because we'd better get fired here at 10

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if we want to burn at 9.

CAPCOM Roger, affirm. We're viewing that right now. Okay, Apollo 8, we're postponing the com test till after the burn.

SC Thank you. Houston, Apollo 8, are you ready to go - for us to go through with the P52 now?

CAPCOM That's negative Apollo 8, we would like to update things first, and we're going to give you a LM state vector and then an external DELTA-V.

SC Roger.

CAPCOM And if crew will accept while we'll go ahead and work on that.

SC Roger.

CAPCOM Apollo 8, Houston.

SC Go ahead.

CAPCOM Okay, we've got your pads we're ready to read up to you. And we're standing by to flank your state vector and external DELTA-V when ever you're ready to give us accept.

END OF TAPE

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CAPCOM We are ready to read up to you, and we are standing by to uplink your state vector and external Delta-V whenever you are ready to us ACCEPT.

SC Roger. Just stand by one and we will get the pad.

SC We will put the TM in ACCEPT now. At this time.

CAPCOM Roger.

CAPCOM Okay Apollo 8 we didn't copy that last one. We are sending you State vector up now.

SC Roger we say we are ready to copy the pass.

CAPCOM Okay, The PAD will be a maneuver PAD MCC one and this will be an SPS G & N beginning with the weight 63295 minus 163 plus 1 2 9 zero one zero 5 9 58 3 zero plus zero zero one 36 minus zero zero zero 45 plus zero zero 2 zero 2 345 188 343 99999 plus zero 1685 zero zero 248 zero zero 2 zero zero one 86 23 2 zero 23 164 zero zero one 2 up 276 left 04 November Alpha for the remainder of that column. In the comments. North stars zero 68 zero 97 356a no ullage start and a single bank burn on bank alpha over.

SC Houston, Apollo 8. MCC one maneuvers SPS G & N 6395 minus 163 plus 129 zero one zero 59 583 zero plus zero zero 136 minus zero zero zero 45 plus zero zero 2 zero 2 345 188 343 99999 plus zero 1685 zero zero 248 zero zero 2 zero zero 186 23 2 zero 13 164 zero 12 up 276 left 04 November Alpha for the remainder. North stars zero 68 pitch zero 97 yaw 356 no ullage single bank alpha.

CAPCOM Roger Apollo 8 that is correct. And I have a TLI plus 11 PAD for you.

SC Roger. Go ahead.

CAPCOM Houston, Apollo 8. Go ahead.

SC Roger. Apollo 8. Lung clear now. Are you ready to copy?

CAPCOM Roger. Ready to copy.

SC Okay, this is a PLI plus 11 FBS g and m. This assumes a mid-course correction number 1 631 40 minus 163 plus 12 niner to zero 13 56 48 97 minus zero, zero 5 minerniner plus zero zero zero zero zero plus 47 zero 16 177 143 zero zero zero november alpha plus zero zero 1 niner 7 47 zero 2 zero 5 51 468 18 12 1283 257 zero 23 up 263 left 17 plus 11 95 minus 165 zero zero 126 83 356 zero 8 zero 5 zero 47 zero 5. North stars zero 68 zero niner 7 356 no ullage. For the fast return P 37 delta V 79 zero zero for the Indian Ocean. High speed procedure not required for the MS. This assumes midcourse correction 1 over.

CAPCOM Standby.

SC Roger.

CAPCOM Houston, Apollo 8 to the revact, are you ready?

SC Go ahead.

CAPCOM GLI plus 11 SDSG and N 63140 minus 163 plus 129 13 56 4897 minus zero zero 599 plus zero zero zero zero zero. And I believe it's plus 47016.

SC That's affirmative.

CAPCOM 177 143 zero zero zero NA plus zero zero 197 47 zero 2 zero 551 46818 12 128.3 257 zero 23 up to 63 left 17 plus 1195 minus 165 zero zero plus 126 23 356 zero 8 zero 5 zero 47 zero 5.

SC The north vat roll 68 pitch 97 yard 356 no ullage. P 37 high speed 79

END OF TAPE

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SC P-37 high speed 7900, Indian Ocean and high speed procedures for the EMS are not required, assumed MCZ1.

CAPCOM Roger, Apollo 8. Two corrections on on the PETI. The hour is 013, springs to go EMS.

SC 013.

CAPCOM Roger. Copy that and the rings to go in the EMS 126 83. Over.

SC 12683.

CAPCOM That's correct.

SC Houston, this is Apollo 8. We advised that we doubted that it would be possible to use the stars to get our backup alignment. We haven't been able to see any stars through the scanic telescope yet.

CAPCOM Roger. Okay, and another comment for you Apollo 8, like for you to use verb 37 to select two and then wait for your computer activity light to go off prior to unzip of the LM man to CSM slot.

SC Roger. Are you ready for us to do that now?

CAPCOM Affirm

SC Houston, this is Apollo 8.

CAPCOM Go ahead.

SC Okay, now we'll go ahead and start back of the flight plan around 8 hours here of T52, right?

CAPCOM Affirmed.

SC We have transferred the state vector to the LM SLA already before we did T52. So we're going to do the 52 now.

CAPCOM Okay, Apollo 8, that's good procedure and

CAPCOM Apollo 8, Houston.

SC Go ahead, Houston.

CAPCOM Rog. Will you check your up-telemetry switch to block please?

SC Houston, block.

PAO This is Apollo Control during that lengthy string of numbers which was read up to the crew from the ground, included in that information was the data that they would need to return to Earth should that be necessary at a point following the mid-course correction and assuming that they were unable to communicate with the ground. This type of information is passed up routinely to the crew during the course of the mission at specified intervals and is kept by the crew for use should it become necessary because of some contingency to return to Earth. At the present time, the mission is proceeding nominally. All the spacecraft systems are functioning very well and we have no problems to speak of at the present time. The crew is very heavily

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PAO involved at this time and preparing for that mid-course correction, the first use of the Service Propulsion System engine. That is scheduled to occur at 11 hours ground elapsed time or about 33 minutes from now. Now that burn is a planned 2-1/2 second burn a very short ignition of the 20 500 pound thrust SPS engine. It will give them a velocity change of about 24 or 25 feet per second. At this time Apollo 8 is about 50 000 nautical miles from Earth and they're traveling at a speed of about 8500 feet per second or around 5 700 miles per hour. We'll stand by to pick up any conversations that develop with the crew prior to this mid-course correction. At 10 hours 27 minutes this is Apollo Control.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 1045, CST 5:35, 52/1

PAO This is Apollo Control, at 10 hours 25 minutes into the flight of Apollo 8. At the present time, our spacecraft is at an altitude of 51,595 nautical miles, traveling at a velocity of about 8300 feet per second. Flight Director, Milton Windler, has just gone around the room here at the Mission Control Center. We viewed the status of the spacecraft and our flight for the first mid-course correction burn and we've passed up a GO to the crew for that maneuver scheduled to occur in just about 15 minutes from now at 11 hours ground elapsed time. And that burn will be a very short one, about 2.4 seconds and will add about 24 or 25 feet per second of velocity to the trajectory. Most of that will be in a posigrade direction, velocity added rather velocity subtracted and there will be also some minor direction change in that most of the velocity is an increase. At the time of ignition, the spacecraft will be at an altitude of about 52,770 nautical miles. We do have a recording of some conversation with the crew over the past 15 or 20 minutes. We'll play that back for you now and then stand by to monitor any conversations that develop.

SC Apollo 8, Houston.

SC Go ahead, Houston, Apollo 8.

CAP COM Okay, we've got a telescope alignment I'd like to give it a try. Your sextant star is still good but if you had problems with that, suppose it worked out that if you look through the telescope at 10:35, we have a shaft and trunnion that you point to the center of the Earth, if you would like to give that one a try.

SC Okay.

CAPCOM Okay, at 10:35, the shaft (garble) 006.2, trunnion 18.9. Over.

SC Roger, 10:35, shaft 006.2, trunnion 18.9.

CAP COM Affirmative.

CAP COM Apollo 8, Houston.

SC Go ahead.

CAP COM Okay, We don't forget a fan, a cyro fan cycle in here before the burn. About 1 minute on each will be fine.

SC Roger. I've already given 2 minutes 02 and 1 and 2 and 021 and I've just started 022.

CAP COM Roger. Thank you.

CAP COM Apollo 8, Houston. We'd like to dump your tape prior to the burn.

SC Roger. It's only been running here about 15 minutes

CAP COM Okay, Apollo 8. That's correct. You're on high bit rate and we're afraid you may run out before the burn so we'd like to dump it and get it back to you with a

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CAP COM . . . full load before the burn.
SC Roger. And give us a comment on the
voice quality.
CAP COM Wilco.
SC Houston, Apollo 8.
CAP COM Go ahead.
SC Roger. We plan to stop charging battery
B in about another 5 minutes. Concur?
CAP COM That's affirmative.
SC Okay, you might just remind us.
CAP COM Wilco.
CAP COM Apollo 8.
SC Go ahead. Go ahead, Houston, you were
cut out.
CAP COM Okay, Apollo 8. All your systems are
GO and we were about to tell you you can go ahead and termi-
nate the battery charge and you beat us to the punch.
SC All that on your mind and it's showing
37 volts right now.
CAP COM Okay.
PAO This is Apollo Control. We had a
relatively quiet period for the last few minutes between
the ground and the spacecraft and we imagine that the crew
is rather actively involved in getting, making final prepa-
rations for their first midcourse correction enroute to the
Moon. That engine ignition is now scheduled to occur about
2 1/2 minutes. Correction, about 6 and 1/2 minutes from
now at 11 hours ground elapsed time. All the batteries
aboard the spacecraft have been fully charged up and they
will be brought on the line during preparation and during
the burn, are to assist in carrying the electrical load
at that time. This is a normal procedure during a maneuver
where the entire guidance and navigation system is required.
We'll stand by to monitor the burn and pick up any communi-
cations with the spacecraft as we go through the final
systems checks and await that midcourse correction.

END OF TAPE

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CAPCOM Apollo 8, Houston, you'll put your high bit rate we'll give you a tape recorder back.

SC Roger.

PAO Here in Mission Control the Guidance Officer has just advised the Flight Director that the spacecraft gimbal motors positioning the SPS engine are in the proper attitude and everything looks go for the burn scheduled to occur now in about 3 minutes. We'll continue to monitor for conversation with the crew.

CAPCOM Affirmative Apollo 8.

SC Apollo 8, command reset to get the motion are now normal.

CAPCOM Roger. Apollo 8, stand by for a MARK at 1 minute.

SC Roger.

CAPCOM Ten seconds, five seconds, 2, 1, MARK 1 minute.

SC Roger.

PAO 1 hour 30 seconds from ignition of the SPS engine for that 2.4 second burn. That maneuver will be primarily to control the altitude of the spacecraft as it goes around the back side of the Moon at perigee. Targeting for there is 60 nautical miles. 10 seconds now till the burn. 5, 4, and we have confirmation of SPS ignition. Thrust looks nominal says the Flight Dynamics Officer. And we should have shut down also, we'll have confirmation of that shortly. And the Guidance and Control Officer advises the Flight Director the burn time was 2.4 seconds exactly nominal, just what was planned. That should have given us a velocity increase of about 24 or 24 feet per second. We've now taken the batteries off the line, their job done in assisting in carrying the heavy - heavier than normal electrical loads during a major maneuver of this sort, even though a very short maneuver. They will then be recharged to bring them up to full charge for the next maneuver or use of the SPS system. The initial indication was that the service propulsion engine which all ground testing and previous flights has shown to be extremely reliable and appears to have demonstrated that reliability once again in this ignition, the first time that engine has been used on this mission. Of course, the Flight controllers here in Mission Control Center are monitoring very closely the performance of the engine and also happy to have this opportunity prior to inserting the spacecraft into lunar orbit. Of course that is the engine that would be required to put the spacecraft into lunar orbit and also to take it out of lunar orbit and send it back to Earth. At 11 hours 2 minutes this is Apollo Control.
END OF TAPE

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PAO This is Apollo Control at 11 hours 08 minutes and we've just gotten a preliminary assessment of the performance of the SPS engine from here in the Mission Control Center and from the indication of the burn the SPS looks to be completely go on the words of the guidance officer and the other flight controllers also concur. The burn was completely nominal in all respects. We also had a post-burn report from Astronaut Jim Lovell aboard the spacecraft and we'll play that back for you now and stand by for any further communication with the spacecraft.

SC Houston, Apollo 8.

CAPCOM Go ahead.

SC Roger. The burn time was on time about 2 seconds. We had residual of 4.4X. We burned it out to .2. Attitudes were nominal. The Delta V stay before the residuals were taken out is minus 2.4. I have transferred the state vector to the LM slot in the verb 67.

CAPCOM Roger. Copy 4.4 per X and 2.4 on the V and negative residual on Y prior to the trim, is that affirmed?

SC That's affirmative. We took out the 4.4 residual down to .2.

CAPCOM Roger.

SC Houston, Apollo 8. Do you want us to start charging Battery A, now?

CAPCOM Stand by.

CAPCOM Apollo 8, let's go back to Battery Bravo, and we'll finish that one off before we start in on Alpha.

SC Roger. Battery Bravo. Houston, Apollo 8, Do you want us to maneuver to any particular attitude for a water dump or do you want us to go to PGC attitude?

CAPCOM Okay, let's go PPC.

SC And give me the angles, please.

CAPCOM Okay, Apollo 8, let's do the same angles we had before - that's pitch 242 and yaw 20 on the PPC attitude.

SC 242 yaw 20. Roger.

SC Houston, we're preparing to dump our waste water now.

CAPCOM Roger.

PAO During that conversation you hear Jim Lovell refer to the residuals, now this is the amount of velocity remaining to be added or taken out of the trajectory following the ignition of the SPS engine and we nominally expect a small residual. We did have residuals of about 4.4 feet according to Lovell, and as per the normal procedure, these were removed by burning the Reaction Control System thrusters - a very short direction burn on those to in effect peak up the affects of the burn and put the spacecraft velocity

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PAO right on the preplanned. At this time
Apollo 8 is at an altitude of some 53 200 nautical miles
and traveling at a speed of 8134 feet per second. This is
Apollo Control at 11 hours 12 minutes into the flight.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 113000, CST 6:20 55/1

PAO This is Apollo Control, 11 hours 30 minutes into the flight of Apollo 8. We have some further refinements on the results of that service propulsion system midcourse correction, the first midcourse correction planned on route to the Moon. The effect of the burn was to give us a parasynthesis or low point closest approach to the Moon of 69 nautical miles. We've been targeting for about 60 nautical miles. This information of course will be evaluated further and refined. This is the preliminary Flight Dynamics Officer analysis of the effects of the burn. And we would expect some update to that. The burn also gives us a time of closest approach to the Moon of 69 hours 10 minutes ground elapse time. The preflight analysis had placed that time at 69 hours 7 minutes, or just 3 minutes different from what we have from the results of the translunar injection and the subsequent midcourse correction. There are four midcourse corrections nominally planned in the flight plan. All of which or none of which could be used on route to the Moon. And depending upon the results of the final analysis on the results of this burn it would be decided whether or not subsequent midcourse corrections would be required. We would anticipate that any subsequent corrections would be quite small. We also had a brief communication with the spacecraft in the last few minutes, and we'll play that back for you now.

SC Houston, Apollo 8.

CAPCOM Go ahead 8.

SC We noticed on our systems test battery vent pressure that when we opened the battery vent valve, we get an immediate drop-off to pressure which nulls out at about 2 tenths of - to 3 tenths of a volt. And we think this is zero and the battery manifolds. You concur.

CAPCOM Okay, stand by and let us check it out. Apollo 8, I cut you out there, what did you say on the last one.

SC It looks like probably that zero psi corresponds to about 3 tenths of a volt on the test meter. We've had it happen a couple of times where the pressure would drop rapidly to this setting as if it were zero, over.

CAPCOM Roger, we'll look at our data here and let you know what we think. You go on ahead with the water dump now.

SC Roger, we'd - we're pausing here on the water dump though just to verify that the battery met - the line is clear as indicated by a battery vent pressure of zero.

CAPCOM Okay, stand by. Apollo 8, Houston.

SC Go ahead, Houston.

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CAPCOM Okay, number 1 on the list of things is that the flight plan shows CDR should hit the sack. Number 2 kind of a summary of your burn. All your SPS and systems look go. The trajectory shows that you have a CPA with a mode of 69.67 miles and the time of perapsynthion is 69 plus 10. You do have capture on a good free return. It's a little bit early to completely evaluate the trajectory for carter control. You'll have no update to the TLI plus 11 block data. After looking through the cal curves it looks like the battery vent pressure is actually zero at .2 to .3 volts, so that - we agree with you there and you can go ahead with the water dump. We still have the com check to do when every we get ourselves in a good high gain look angle and whenever it's convenient for you, over.

SC Thank you very much. That was a very fine resume you sent in. We're right now in the process of trying of dump out the water and the USDA and so on and so on. So we'll get with you on the high gain as soon as we can.

CAPCOM Okay, good burn.

SC Houston, what do you want to dump the waste tank down to.

CAPCOM Apollo 8, I would like you to dump the waste tank to 25 percent.

SC Okay. we're dumping now Houston.

CAPCOM Okay, thank you.

SC We finally got some stars to see.

CAPCOM Apollo 8, Houston.

SC Go ahead Houston, Apollo 8.

CAPCOM Roger, do you folks have your water quantity switch in the portable or the waste water tank position now?

SC We're in the waste tank position now, and we're dumping UTCA's first, Houston.

CAPCOM Okay, we weren't watching any waste quantity decrease and it looked like the nominal temps indicated that something was going on, and we were trying to figure out what was going on.

SC We'll there's a lot of stuff going on I'll tell you. How do nominal temps look?

CAPCOM Oh, about 81.

SC Okay, we'll keep on going then.

PAO Communications continue to be excellent with the spacecraft. We're continuing to track with the 85 foot antenna at Goldstone - Goldstone, California. The crew reported earlier that the signal strength indication that we had was above normal, above what they would expect. And up to this point we've had extremely good results from the unified S-band communications system. Spacecraft is presently about 50 thousand nautical miles from Earth as shown on the

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large plot board here in the front center of Mission Control Center. We expect the crew will begin a series of relatively relaxed activities aboard the spacecraft. Commander Frank Borman after a very long day is scheduled to have a 7 hour sleep period, and he should be in that sleep period at the present time. Following Borman's sleep cycle, Lovell and Anders will get their sleep period in about another 6 and a half hours. At 11 hours 39 minutes this is Apollo Control.

END OF TAPE

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PAO This is Apollo Control at 12 hours 04 minutes into the mission. The flight of Apollo 8 continues to progress very smoothly at this point. Both, here in the mission control center and in the spacecraft things have quieted down considerably since that mid-course correction maneuver. At the present time Commander Frank Borman is scheduled to begin a 7-hour sleep period, and his fellow crewmen, Jim Lovell and Bill Anders, are presently involved primarily in some housekeeping functions aboard the spacecraft, managing the systems, and also apparently from the communications with the ground, they are involved in taking some pictures. We have several minutes cumulated tape on communications with the spacecraft over the past 30 minutes and we'll play that back for you now.

SC Okay, Houston. We're going to dump the waste tank on down to about 25 percent.

CAPCOM Okay, thank you.

SC Houston, Apollo 8. Do you copy?

CAPCOM Affirmative, Apollo 8.

SC Okay, tell Zeke Thomas to wake up and keep an eye on the waste tank servicing.

CAPCOM That'll take a minute to think of something appropriate.

SC You're slowing down.

CAPCOM So are you guys.

SC How do the nominal temperatures look in Houston?

CAPCOM Stand by.

SC Now you're looking pretty small down there now, Houston.

CAPCOM We're carrying a big stick, though.

SC We can just barely make out Clear Lake.

CAPCOM And your nominal temperatures have dropped from about 94 to around 66.

SC Okay. I'm showing just a little bit above 50 percent here and we'll keep on going and if it looks too cold, give us a call.

CAPCOM Okay, we'll do that.

SC Houston, we had a momentary 02 high at 12 and we think it's due to all the purging of the water lines we're doing here in the cabin.

CAPCOM Roger. We concur.

CAPCOM Apollo 8, Houston, we show you down to 25 percent of your waste water.

SC Okay, I'm about 28 - Houston stand by just a minute. Okay, waste dump stopped and then purge again.

CAPCOM Roger, waste dump stopped.

SC Rog.

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SC Houston, we're on a high gain and it might be a good time to try the intercom check.

CAPCOM Apollo 8, we're going to go ahead and crank up to a comm test now, and we will be a little bit late on your update for 12 hours.

SC Okay.

CAPCOM Do you still want our - have us command as much as we can on the ground or would you like to move the switches yourself?

SC Oh, you can have the fun of doing it.

CAPCOM I like your drag in there.

SC They're using test to ground bar. We're using 1/250 on an F-11 on CEX and CMAX for Earth shots, do you verify me?

CAPCOM Okay. You got going before I got my pencil up. How about saying it again?

SC F-11 and 1/250th for CEX 16 mm and C 70 mm.

CAPCOM Okay. Thank you.

SC How about running in by the back room, boy. My light meter doesn't seem to be helping out too much.

CAPCOM Okay.

CAPCOM Okay, Apollo 8, We're starting in setting in for our first comm test. This is going to be a mike-link voice, linking and fold-down link, which is not anything really different than what you have onboard. I would like for you to verify that the S-band nominal mode voice switch is in voice.

SC Roger. Voice.

CAPCOM Okay, and the up telemetry data to DATA.

SC Roger. DATA.

CAPCOM Up telemetry command in NORMAL.

SC Roger. NORMAL.

CAPCOM High gain antenna to AUTO TRACK.

CAPCOM Correction. That's

SC AUTO

SC We're in AUTO and you can go ahead and dump the tapes.

CAPCOM Okay, I'd like for you to go to narrow beam.

SC Okay, going to narrow beam now.

CAPCOM Rog.

CAPCOM Okay and I'll give you a call when we get ready to work on the tape.

SC Okay. We're still in PTC, so we're only going to have it for about 10 or 15 minutes.

CAPCOM Okay, we've had some problems with our displays and I think they're straightened out now, but you may have to keep us advised if we run out of limit in case we display again.

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CAPCOM we went through that display again.
SC Rog.
CAPCOM Say, while we're standing by here, Apollo 8, the service module quantities that we had listed, we're going to try to update them, if you want to call all your quantities. Have you checked them with your charts?
SC Negative. I haven't gotten around to that. Stand by.
CAPCOM Okay. here's no hurry on that. I just wondered if you had done it, we will check it against what we've got on our nova 9.
SC I'm showing a SPS helium pressure, about 35 70, indicated onboard.
CAPCOM Rog.
SC And fuel LOX tank pressures are 177 and 176 respectively.
CAPCOM Okay.
SC M2A is 2400 B 2500.
CAPCOM Okay.
CAPCOM Okay, and our back room tells you that you've got the right f stop.
SC Okay, then we'll keep using it. SPCT attitude really isn't the greatest for taking pictures of the Earth.
CAPCOM Rog.
SC Or of the Moon.
CAPCOM Apollo 8, Kinda stand by for a burst of noise as we change configurations on the ground. We're going into test 1. You'll still have up and down link and we'll be in this mode for 2 minutes. You may hear some burst of noise as we change.
SC Roger.
CAPCOM Okay, Apollo 8, we're in the middle of our first test and how about giving me a voice check.
SC Roger, Houston. This is Apollo 8. One, two, three, four, five. Five, four, three, two, one all the way up.
CAPCOM Roger and read you loud and clear. This comm is unbelievably good.
SC Good.
CAPCOM Okay, Apollo 8, we've finished the first test and we're now going to change the up link mode to up link command and ranging, and we'll be going without up voice. We'll be in this mode for 2-1/2 minutes and will be sending a test message. It'll have no affect on either your computer or your panel switch configuration. What you might see will be the 3-band noise that's associated with the break locks. However, you should still have a good signal on your power meter. This is not a loss of signal, but rather just a loss

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CAPCOM of the voice modulation, and I'll do you a mark just before we do that so that you can turn your S-band volume down if you so desire, and we'll be back up in this mode that we're in now in 2-1/2 minutes.

SC Roger.

CAPCOM Apollo 8, Houston. We're about to disable the voice modulation uplink and we'll be back up no later than 12:13.

PAO This is Apollo Control at 12 hours 14 minutes into the mission now. Apollo 8 is presently some 57 000 rather 58 000 nautical miles from Earth, 58 334 according to our displays here in Mission Control Center, and the spacecraft is traveling of 7700 feet per second. We do expect probably for the rest of the night we'll have a rather quiet period, here in Mission Control Center. The commander, Frank Borman, is in his 7-hour sleep period

END OF TAPE